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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/809,832

03/26/2004

Seishi Kasai

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10/19/2007

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WASHINGTON, DC 20037-3213

EXAMINER

GODFREY, KEITH JOSEPH

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/809,832	<b>Applicant(s)</b> KASAI ET AL.	
	<b>Examiner</b> Keith J. Godfrey	<b>Art Unit</b> 1732	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 July 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 2-4, 8-15 and 18-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-4, 8-15 and 18-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 05/23/2007 has been entered.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 2-4, 8-10, 12-15, and 18-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Brodtkin et al (U.S. Patent 6,322,728), and further in view of Halloran et al (U.S. Patent 6,117,612).

**As to claims 2-3**, Brodtkin et al. (US 6322728), hereinafter "Brodtkin", teaches a method including:

-forming a powdered layer over selected depressed regions (col. 3, lines 63-67 and col. 4, lines 1-3). It is the Examiner's position that the depressed regions, having

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been shaped before forming a powder layer thereon, embrace predetermined dimensions (*prescribed thickness*). Further, Examiner interprets that any substance, including Brodkin's powder, will have a refractive index value ( $n_1$ ); -spreading liquid binder material in to the selected regions of powder thereby causing the powdered material to bond in the cross sectional shape of the depressed region (col. 4, lines 29-34). Congruent with Examiner's position above, Brodkin's binder will also have an intrinsic refractive index value ( $n_2$ ). The selected areas correspond to an intersection of a desired plane (*cut surface*) with a CAD representation of the article (col. 4, lines 1-10; 29-34).

-repeating the powder/binder forming steps successively to build a layered (*laminated*) article (col. 4, lines 38-39).

Brodkin discloses UV absorbers in the polymer matrix (*curable binder*) (col. 6, lines 53-54) but does not expressly teach a UV curable binder and the step of irradiating to effect cure.

Halloran teaches a UV curable liquid phase which is irradiated by a UV laser to produce the bound article (col. 5, lines 18-24 and col. 6, lines 33-37). The liquid phase of the Halloran system is comparable to the binder of the claim recitation in that it is the medium of polymerization pursuant to irradiation. The application of the medium to the powder differs, but the result of the combination is the same. The shift in application from precursor mixture to deposition would have been obvious as a matter of choice to one of ordinary skill in the art. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the UV curable liquid binder

and UV radiation curing means to bond the powder and binder, as taught by Halloran, in the method of Brodtkin because UV radiation is a controllable and conventional curing means. Because both of the references are concerned with a similar technical field, namely that of free-form fabrication, one would have a reasonable expectation of success from the combination.

Brodtkin does not expressly teach that  $n_1$  and  $n_2$  satisfy the relationship  $-0.1 \leq (n_1 - n_2) \leq 0.1$ .

Halloran et al. (US 6117612), hereinafter "Halloran", teaches a method including a  $\Delta n$  refractive difference reduced to zero, or "index matched" (col. 3, lines 60-68 and col. 4, lines 37-42). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use an approximate zero refractive index difference between the binder and powder, as taught by Halloran, in the method of Brodtkin to eliminate scattering, so the depth of cure would be limited only by photoinitiator absorption (Halloran—col. 4, lines 39-41).

Further, Brodtkin does not expressly teach a binder wherein after curing with UV irradiation not more than 5% by weight of a volatile component remains.

Halloran teaches a resin binder before curing containing 4.1% weight methylene bisacrylamide, a volatile organic compound (*volatile component*) (col. 11, lines 17-22 and col. 6, lines 1-5). It is the Examiner's position that water is conventionally not a volatile component or volatile solvent and as such will not be interpreted as a *volatile component*. It is further noted that the methylene bisacrylamide described in Halloran's example 7 is measure before curing, and thus cannot increase above 4.1% by weight

with subsequent curing. As such the binder taught in Halloran's example 7 reads on claims 2 and 3. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a volatile component less than 5% by weight, as taught by Halloran, in the process of Brodtkin to assure penetration of the cure into sub layers, thereby providing integrity of the build.

**As to claim 4**, Brodtkin teaches, at lines 47-57 in column 5, that a plastic powder can be used with a plastic binder. It would have been obvious to one skilled in the art, pursuing a match of refractive indices, to use powder and liquid forms of the same material to bind the powder.

**As to claims 8-9**, Brodtkin further does not teach that the UV binder contains a polyfunctional acrylate or methacrylate monomer.

Halloran teaches that the UV curable material is an acrylate monomer (col. 5, lines 56-69) and still further teaches a weight percent of the monomer overlapping the claimed range (col. 6, lines 5-10). Halloran also teaches a viscosity of the liquid phase below 10 mPa·s (col. 5, lines 65-67). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the resin material of Halloran in the method of Brodtkin to produce a binder of low viscosity.

**As to claim 10**, Brodtkin does not expressly teach a UV curable binder which contains not more than 70% weight of a viscosity modifying additive although a filler of 65-85% weight is disclosed at line 33 in column 7. Examiner notes that such an additive would modify the viscosity of the liquid phase component.

**As to claim 12-13**, Brodkin teaches the addition of colorants and dyes (col. 5, lines 58-62).

**As to claim 14**, Brodkin does not teach a viscosity range of 1-30 mPa·s for the UV binder, as required by claim 14. Brodkin further does not teach a solvent free UV binder, as required by claims 18, 19, and 20.

**As to claim 15**, Brodkin further teaches an inkjet mode of feeding binder (col. 4, lines 29-34).

**As to claims 18-20**, Brodkin does not teach a solvent free UV binder.

Halloran teaches a "neat" (solvent-free) liquid phase (col. 6, lines 14-16).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the Halloran's solvent-free binder in the method of Brodkin to for better storage and low emissions of VOC solvents.

**Claim 11** is rejected under 35 U.S.C. 103(a) as being unpatentable over Brodkin in view of Halloran, as applied to claims 2-4, 8-10, 12-15, and 18-20 above, and further in view of Maitland (UV Printing/UV Chemistries).

Brodkin modified by Halloran discloses the process of claims 2-4, 8-10, 12-15, and 18-20, as discussed above. Brodkin also teaches incorporating a photopolymerization initiator, as required by claim 11, at lines 53-67 in column 6. The reference mentions UV, and therefore, the range of 450 to 250 nm is implicit.

Brodkin modified by Halloran does not disclose an initiator of range 0.05% to 10% by weight, as required by claim 11.

Maitland teaches an initiator concentration of 2% to 5% in page 3, "UV Formulation".

Brodkin, Halloran, and Maitland are combinable because they are concerned with a similar technical field, that of UV curing. It would have been obvious to one of ordinary skill in the art at the time of the invention to include in the process of Brodkin and Halloran the polymerization initiator range of Maitland, and would have been motivated to do so to prevent yellowing the product

#### ***Response to Amendment***

The declaration under 37 CFR 1.132 filed 07/05/2007 is insufficient to overcome the rejection of claim 2-4, 8-15, and 18-20 based upon U.S.C. 35 103(a) rejection as set forth in the last Office action because: It has been submitted that the Examiner's position that water is not conventionally considered a volatile component is maintained. As such, the water content of Halloran is not considered when measuring weight percent of a volatile component. The declaration merely points to the residual water content and not the methylene bisacrylamide content, which is the volatile component of the UV curable binder, and therefore is not persuasive.

#### ***Response to Arguments***

Applicant's arguments filed 07/05/2007 have been fully considered but they are not persuasive. Applicant contends that the claimed feature of "*not more than 5% by*



*weight of a volatile component of the UV binder after curing...*" has not sufficiently been rejected. Examiner maintains the prior art rejection discussed above.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keith J. Godfrey whose telephone number is 571-272-6391. The examiner can normally be reached on 8:00-5:00 Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina A. Johnson can be reached on 571-272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

kjg

  
CHRISTINA JOHNSON  
SUPERVISORY PATENT EXAMINER